Centrality Dependence of Directed and Elliptic Flow at the SPS

A.M. Poskanzer and the NA49 Collaboration

New data with a minimum bias trigger have been taken by NA49 for 158 GeV/nucleon Pb + Pb in order to study azimuthal asymmetry as a function of the centrality of the collision. Previously, directed and elliptic flow as measured by the Main Time Projection Chambers was reported[1,2] for a medium bias trigger (b = 6.5 – 8 fm). In addition, the present study uses global tracking of charged particles in all four of the NA49 TPCs, and thus covers a larger region of phase space. We use a Fourier expansion of the azimuthal distribution of particles[3] in which the first harmonic coefficient corresponds to directed flow and the second harmonic coefficient corresponds to elliptic flow.

Particle identification using the pulse height in the TPC is used to identify the pions and protons. The event planes are made isotropic in the laboratory by weighting with the inverse of the laboratory azimuthal distributions of the particles. The results are corrected for the resolutions of the estimated event planes using the strength of the correlation of the planes of randomly chosen subevents. The data are sorted according to centrality by using the signal in the zero-degree calorimeter. We find that the pion directed flow increases monotonically as the collisions become more peripheral as shown in Figure 1.

[1] H. Appelshäuser *et al.*, NA49, Phys. Rev. Letters **80,** 4136 (1998).
[2] A.M. Poskanzer *et al.*, NA49, Nucl. Phys. **A638**, 463c (1998).
[3] A.M. Poskanzer and S.A. Voloshin, Phys. Rev. C **58**, 1671 (1998).

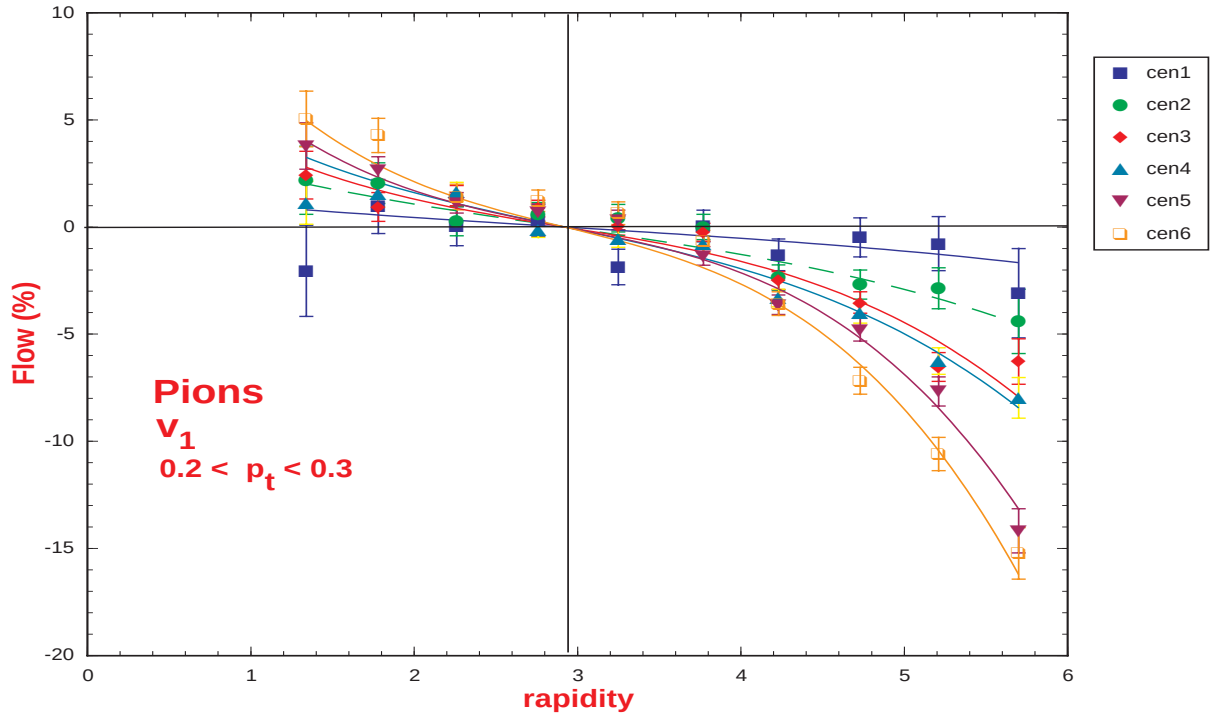

Fig. 1. The rapidity dependence of the directed (v_1) flow for pions ($0.2 < p_t < 0.3$ GeV/c). The curves, which guide the eye, go from the most central (cen1) to the most peripheral (cen6).